

US LHC Accelerator Project	Baseline Change Request
BCR Number 027	
WBS 1.1.4	
Title Change in ETC for IR Absorbers	
Change Control Level 2	
Originator William C. Turner	
Date 26 June 2001	

Description of change

The purpose of this BCR is to re baseline the estimate to complete (ETC) for the IR Absorber task taking account of the last two bottoms up cost estimates. The first of these cost estimates was completed and reviewed on 27 July 2000 and is referred to as the "Jul 00" estimate. The second was completed and reviewed on 23 Apr. 2001 and is referred to as the "Apr 01" estimate. (These estimates covered the IR absorbers, but not the luminosity instrumentation, which has been the subject of a separate series of BCRs, most recently BCR 24, which was approved on 25 May 2001. This BCR makes no change in the budget for the instrumentation, but the total cost estimates displayed here include the instrumentation subtasks, since they are part of WBS 1.1.4.)

In order to compare these two estimates the first one has been escalated from FY00\$ to FY01\$ and the start date for work to go has been adjusted to 1 Apr. 2001 to coincide with the Apr 01 estimate. The adjustment in start date accounted for work that had been completed between the two ETCs. The Jul 00 ETC exceeded the budget to complete (BTC) by \$377.5k in FY01\$ not including G&A. The Apr 01 ETC resulted in an additional increase in ETC by \$434.6k in FY01\$ not including G&A. The present ETC for the IR Absorber task is \$2235.8k in FY01\$ not including G&A and exceeds the BTC by \$812.1k not including G&A.

There is no change in deliverable as a result of this BCR. The Jul 00 and Apr 01 ETCs occurred after the EDR and PRR respectively. The increase in the Jul 00 ETC compared to the BTC is due to changes in the detailed designs of the TAS and TAN which occurred between the CDR and EDR due to better understanding of the requirements. The increase in the Apr 01 ETC compared to Jul 00 is due largely to better understanding of the assembly and test parts of the work which occurred in preparation of the schedule for the PRR. The schedule presented at the PRR is much more detailed and complete than the schedule used for the baseline.

For purposes of this BCR the ETC covers the period from 1 Apr. 2001 to completion 31 Dec. 2004.

Reason for change

The reason for the change is bring the project tracking cost and schedule machinery into line with the present ETC so the variance analyses from now to completion are more meaningful. The IR Absorber task has not been re baselined since the original BAC was established in Feb. 1998.

The cost drivers for the bottoms up ETCs completed on 27 July 2000 and 23 Apr. 2001 were examined in detail at the respective reviews.

The July 00 ETC was completed just following the EDR on 13 July 2000. The cost changes were predominantly in fabrication and due to the changes that had occurred between conceptual design and the final design. A list by lowest level WBS number of the cost changes exceeding \$1k contained 38 items, some with cost increase and some with cost decrease, and accounted for 92% of the increase in fabrication costs.

The PRR for the IR Absorber task was held on 2 Nov. 2000. The changes in ETC between Apr 01 and Jul 00 almost all have to do with the details of assembly, test and QA. A list of these is given in Table 1 obtained by summing changes at the lowest level WBS number. The items in Table 1 account for \$365k, or 84%, of the \$434.6k increase in the cost to complete.

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Table 1: Cost drivers for the Apr 01 ETC.

Description	Variance
Fabrication	
Heavy part handling labor	-86
Increase test labor	-83.3
5% proc. rework	-52.6
B60 floor space	-49.9
Increase TAN vac ch matl and labor	-42.3
Addtl test equip	-27.7
QC, matl handling logistics	-25.1
Reduction in TAN abs box steel	32.1
Reduction in TAS gallus assy	22.4
Total fab items > \$20k	-312.4
EDIA	
Design engr for proto TAN vac ch	-35.3
Increase as built dwgs effort	-17
Total EDIA items > \$15k	-52.3

Impact on other sub-systems

None.

Impact on cost

Table 2 shows the change between the Jul 00 and Apr 01 ETC at level five in the WBS structure. The numbers in Table 2 are given in FY01\$ without G&A. Of the total \$434.6k increase in ETC, \$400.1k is in fabrication, \$10.6k in shipping and \$23.9k in EDIA.

Table 3 shows the Apr 01 ETC in FY01k\$ including G&A, \$2,534.3k.

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Allowing for escalation by using the Millennium yearly escalation rates, the ETC in as spent dollars (ASk\$) is \$2,567.0k including G&A. As of the end of Mar. 2001 the ACWP for WBS 1.1.4 was \$2,430.7k including G&A. The EAC is therefore \$4,953.5k in ASk\$ including G&A. Compared to the BAC the CVAC is -\$923.4k in ASk\$ including G&A. These numbers are summarized in Table 4.

Table 2: Comparison of July 00 and Apr 01 Estimates to Complete for the IR Absorber Task, FY01k\$, not including G&A

WBS	Description	Jul 00 ETC FY01k\$	Apr 01 ETC FY01k\$	Change FY01k\$
1.1.4	IR Absorbers	1801.2	2235.8	-434.6
1.1.4.1	Fabrication	1337.3	1737.4	-400.1
1.1.4.1.1	TAN fab	530.4	707.3	-176.9
1.1.4.1.2	TAS fab	397.4	456.2	-58.8
1.1.4.1.6	Assembly	316.4	420.7	-104.3
1.1.4.1.7	Test	93.1	153.2	-60.1
1.1.4.2	Shipping	129.1	139.7	-10.6
1.1.4.2.1	TAN ship	104.3	111.3	-7.0
1.1.4.2.2	TAS ship	24.8	28.4	-3.6
1.1.4.3	EDIA	277.5	301.4	-23.9
1.1.4.3.1	TAN EDIA	149.9	142.0	7.9
1.1.4.3.2	TAS EDIA	127.6	159.4	-31.8
1.1.4.4*	Instrumentation	57.3	57.3	0.0

*The figure entered under "Jul 00 ETC" is budget defined by BCR 24, which was approved on 25 May 2001.

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Table 3: The Apr 01 ETC for the IR Absorber task, FY01k\$, including G&A

WBS	Apr 01 ETC w/o G&A FY01k\$	G&A FY01k\$	Apr 01 ETC incl. G&A FY01k\$
1.1.4	2235.8	298.5	2534.3
1.1.4.1	1737.4	211.9	1949.3
1.1.4.1.1	707.3	76.2	783.5
1.1.4.1.2	456.2	49.5	505.7
1.1.4.1.6	420.7	57.5	478.2
1.1.4.1.7	153.2	28.7	181.9
1.1.4.2	139.7	20.9	160.6
1.1.4.2.1	111.3	16.2	127.5
1.1.4.2.2	28.4	4.7	33.1
1.1.4.3	301.4	57.2	358.6
1.1.4.3.1	142.0	26.9	168.9
1.1.4.3.2	159.4	30.3	189.7
1.1.4.4	57.3	8.5	65.8

Table 4: IR Absorber EAC in ASk\$ including G&A

WBS	ETC(ASk\$)	ACWP(ASk\$)	EAC(ASk\$)	BAC(ASk\$)	CVAC(ASk\$)
1.1.4	2,567.03	2,430.70	4,997.73	4,074.30	-923.43

Impact on schedule

There are two remaining L3 milestones for the IR Absorbers; 3-1.1.4-10 Begin the assembly of the TAN and TAS and 3-1.1.4.14 Complete the assembly of TAN and TAS (on dock at CERN). The baseline dates for these milestones are 1 Sep. 2001 and 1 Sep. 2002 respectively. The MS Project schedule prepared with the ETC given in this BCR shows a pre assembly review scheduled on 5 Oct. 2001. Procurements for the TAN and TAS are well along as of the submission of this BCR so completion of milestone 3-1.1.4-10 can be considered achieved on the date of the pre assembly review. The new MS Project schedule also shows the TANs received at CERN on 27 Aug. 2002 and the TASs received at CERN on 3 Jan. 2003. The CERN windows of earliest and latest dates for delivery of IR components are Feb. 2003 – Aug. 2005 for IR1 and Apr. 2004 – Aug. 2005 for IR5. The change in delivery dates should have no impact on the CERN schedule.

